LOCAL SEED BEAN POPULATIONS FROM THE OLTENIA AREAL AND THEIR BREEDING VALUE

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Abstract: *In our country, the cultivated surfaces with seed bean decreases in the last decade because of the change of the field possession and because of the lack of some sales markets of the yield. In the present, the interest for this plant began to rise, so t is necessary to create new seed bean varieties which correspond to the requests of the modern world. In the case of the field bean it is required that the new create varieties to be characterized through a good yield capacity, resistance to pests and diseases, resistance to some unfavourable ecological factors action and superior quality. For that, it is necessary that the sources of genes having in possession to be as richer and diverse and the local populations represent an important category of genetic resources. To Banu Maracine R.S. of University from Craiova it was organized in 2005-2008 period an experience which had as the aim to study the variability of some bean populations from Oltenia area along with homologate varieties and the possibility of using these populations with the view to choose valuable genotypes for breeding. On the basis of the obtained results in the case of the study of the variability of the quantitative characters by using limit differences it were retained for multiple comparisons ten genotypes which emphasized as concern some studied characters and became from five different areas from Oltenia. Biological material was represented by Star variety and the populations of: Bralostita-Dolj, Targu-Jiu-Gorj, Poiana Mare-Dolj, Boureni-Dolj, Ianca-Olt, Osica-Olt, Ostroveni-Dolj, Leu-Dolj, and Pielesti-Dolj. These genotypes presented specific morphological characters and some valuable issues which were analysed by multiple comparison method (Duncan Test). These comparisons were made for the next groups of characters: stem heights, number of ramifications on the stem, the insertion height of the first pod, average number of seed in a pod, total number of seed per plant and one thousand seed mass. It was established that the local seed bean populations from Oltenia area represents a valuable material, with high genetic variability which allow their use as gene sources for breeding process*

Key words: *bean, varieties, local populations, breeding programme*

INTRODUCTION

In the anterior period of the homologation of the first breaded native varieties, in our country was cultivated especially varieties and local seed bean populations. Because these presented certain deficiencies, their yield being unsatisfactory and characterized through high fluctuations from one year to another, by breeding works were undertake a series of objectives which aim to improve these deficiencies. First, it has in the view to increase the productivity, simultaneous with the increase of seed quality, expressed through the increase of protein content, the decrease of shell percent, the improve of boiling capacity and culinary issues. The precocity was fallowed especially with the view to create very early lines and varieties of seed bean which can be cultivated in double crops in the irrigation conditions (SEVERIN and co., 1979). Through repetitive individual selection in some hybrid populations was obtained Star variety, homologated in (DINCA and POPA, 1984), which is the control of this experiment.

After year 1995, the prioritary objective of the breeding bean programme is to improve drought and intense heat, respectively, to improve yield seed stability and quality. As it is known to bean crop, drought and intense heat represents the main limitative factors for seed yield, these factors leading to total compromise of the crops in some areas so it happened

in 2000 year in South country. The realization of this aim depends on the identification of tolerant and resistant genotypes from the local populations and the chance to transfer these genes of resistance to the cultivated species.

The achieved genetic progress was constant and obvious for all important traits, and the accumulation of valuable genes into the current germplasm allows solving of new challenges, especially those related to climatic changes.

MATERIALS AND METHODS

The experience organized to Banu Maracine R.S. of University from Craiova had as the aim the study of some bean populations from Oltenia along the homologate varieties with the view to get out valuable genotypes for breeding. In this way, in the collection of local seed bean populations were initially studied a number of 80 genotypes of native provenience. These were subjected to a preliminary study and don this basis were retained the genotypes considered useful for breeding programme.

The obtained results in the case of the study of the quantitative characters variability, using the limit difference, were retained for multiple comparison 10 genotypes which emphasized as concerns some of the analyzed characters. Biological material was represented by Star variety and the populations of: Bralostita-Dolj, Targu-Jiu-Gorj, Poiana Mare-Dolj, Boureni-Dolj, Ianca-Olt, Osica-Olt, Ostroveni-Dolj, Leu-Dolj, and Pielesti-Dolj. These genotypes presented distinct morphological characters and some valuable issues which were analyzed by multiple comparison analysis.

The characterization and the appreciation of the biological material value for their use in the breeding programme was made for the next elements: the variability of the main morphological characters, plants heights, number of ramifications, the height of the first pod insertion, number of fertile pod per plant, average number of seed per pod, total number of seed per plant and one thousand seed mass.

The emphasize of the morphological differences from the genotypes was realized by the analysis of the difference significance from the average level of each character and the average of Star variety, taken as control and the analyses of ten genotypes, considered useful, on the basis of multiple comparison (Duncan test).

For the comparison of each variant from an experiment it is frequently used Duncan test. As opposed to limit difference method it is working with more theoretically values t and in the calculation it is using the error of average instead of the error of difference (s_d). For the comparison of the variants placed in different classification interval sit is using the theoretical significance differences DS (R_p) calculated after the next formula:

DS 5 %= s_x x q 5 %, where q are the values from the tables corresponding with GL_E and the number of variants placed between the limits comparison. These values are multiplying with s_x; q values vary depending on the number of averages and the liberty degrees.

It is comparing the real differences with the corresponding DS 5 % and if these are higher than DS 5% are considered as significant (CIULCA, S., 2002).

RESULTS AND DISCUSSIONS

The exteriorization degree of the quantitative characters of these genotypes and their variability is presented in table 1. Analyzing the obtained data it can notice high differences between genotypes as concern the plants height, average number of seed/ pod, total number of seed/plant and one thousand seed mass.

To emphasize the valuable genotypes and to compare between them more variants it was used the test of multiple comparisons (Duncan test). The establishment of the significance

of the differences was made on the basis of the classification of the variants in decrease order, depending on the average of the analysed characters.

Table 1

The phenotipic variability of the morphological characters to some bean genotypes cultivated to Banu Maracine R.S. (average 2005-2008)

Crt. no.	Genotype	Stem height (cm)	Number of ramifications	The height of first pod insertion (cm)	Average number of seed/plant	Total number of seed/plant	One thousand seed mass (g)
1.	Star	60.1	4.33	9.88	5.07	120.10	221.0
2.	Bralostita	37.4	4.60	12.80	2.64	62.06	429.4
3.	Targu Jiu	66.7	6.32	11.87	5.11	95.17	254.5
4.	Poiana Mare	47.5	6.62	11.76	4.14	90.95	384.6
5.	Boureni	78.2	3.85	12.76	4.63	106.0	338.2
6.	Osica	58.62	4.08	12.06	3.75	86.56	344.0
7.	Leu	66.1	4.53	14.08	3.65	99.26	284.4
8.	Ianca	84.0	3.90	9.33	4.08	100.5	316.0
9.	Pielesti	35.1	4.61	12.53	4.02	78.74	286.0
10.	Ostroveni	70.9	4.96	12.26	4.13	80.06	308.6

Table 2

The analisys of multiple comparison (DUNCAN test) for the stem height character to some bean genotypes cultivated to Banu Maracine R.S. (average 2005-2008)

Clasification	Variant	Stem height (cm)	The difference towards the variant on the place:								
-	-	-	X	IX	VIII	VII	VI	V	IV	III	II
I	Ianca	84.0	48.90^{x} 20.59	46.60^{x} 20.46	36.50^{x} 20.22	25.38^{x} 20.03	23.9^{x} 19.72	17.90 19.41	17.3 18.97	13.1 18.35	5.8 17.4
II	Boureni	78.2	43.10^{x} 20.46	40.8^{x} 20.22	30.70^{x} 20.03	19.58 19.72	18.1 19.41	12.1 18.9	11.5 18.35	7.3 17.42	
III	Ostroveni	70.9	35.80^{x} 20.22	33.5^{x} 20.03	23.4^{x} 19.72	12.28 19.41	10.8 18.97	4.8 18.35	4.2 17.42		
IV	Targu Jiu	66.7	31.6^{x} 20.03	29.3^{x} 19.72	19.2 19.41	8.08 18.97	6.60 18.35	0.6 17.42			
V	Leu	66.1	31.0^{x} 19.72	28.7^{x} 19.41	18.6 18.97	7.48 18.35	6.0 17.42				
VI	Star	60.1	25.0^{x} 19.41	22.7^{x} 18.97	12.6 18.35	1.48 17.42					
VII	Osica	58.62	23.52^{x} 18.97	21.22^{x} 18.35	11.12 17.42						
VIII	Poiana-Mare	47.5	12.4 18.35	10.1 17.42							
IX	Bralostita	37.4	2.3 17.42								
X	Pielesti	35.1									

These comparisons were made to the next groups of characters: stem height, number of ramifications per stem, the height of the first pod insertion, average number of seed per pod, total number of seed per plant and one thousand seed mass.

Comparing the populations between them as concerns the stem height, on the basis of Duncan test (Table 2), the obtained values emphasized the existence of some major differences between the analyzed genotypes; from the total of 45 cases, in 19 cases the difference are significant. It can appreciate that the population of Ianca which is placed first presents significant differences toward the last five genotypes, and the populations of Boureni and Ostroveni which presents semnificative differences comparative to the last three variants.

It can appreciate that this character presents a high variability mainly due to the difference between genotypes as concerns the provenience.

Table 3

The analisys of multiple comparison (DUNCAN test) for the height of the first pod insertion character to some bean genotypes cultivated to Banu Maracine R.S. (average 2005-2008)

Clasification	Variant	First pod insertion height (cm)	The difference towards the variant on the place:								
-	-	-	X	IX	VIII	VII	VI	V	IV	III	II
I	Ianca	14.8	5.47^{x} 1.85	4.92^{x} 1.84	3.04^{x} 1.82	2.93^{x} 1.80	2.74^{x} 1.78	2.54^{x} 1.75	2.27^{x} 1.71	2.04^{x} 1.65	2.0^{x} 1.56
II	Boureni	12.80	2.92^{x} 1.84	3.47^{x} 1.82	1.04 1.80	0.93 1.78	0.74 1.75	0.54 1.71	0.27 1.65	0.04 1.56	
III	Ostroveni	12.76	3.43^{x} 1.82	2.88^{x} 1.80	1.0 1.78	0.89 1.75	0.7 1.71	0.5 1.65	0.23 1.56		
IV	Targu Jiu	12.53	3.20^{x} 1.80	2.65^{x} 1.78	0.77 1.75	0.66 1.71	0.47 1.65	0.27 1.56			
V	Leu	12.26	2.93^{x} 1.78	2.38^{x} 1.75	0.5 1.71	0.39 1.65	0.20 1.56				
VI	Star	12.06	2.73^{x} 1.75	2.18^{x} 1.71	0.3 1.65	0.19 1.56					
VII	Osica	11.87	2.54^{x} 1.71	1.99^{x} 1.65	0.11 1.56						
VIII	Poiana-Mare	11.76	2.43^{x} 1.65	1.88^{x} 1.56							
IX	Bralostita	9.88	0.55 1.56								
X	Pielesti										

The height of the first pod insertion represents an important character for bean especially for mechanical harvest and from this point of view the population of Leu-Dj presents significant difference which indicates o high difference between this population and other genotypes taken into study (Table 3). From the total of 45 differences, by applying Duncan test it can notice that almost half of them (23)are significant, which underlines once again the fact that there is a high variability as concerns the character of the insertion of the first pod to the studied material.

The number of seed/pod is a complex character, polygenic determined, but powerfully influenced by the climatic conditions.

Table 4

The analisys of multiple comparison (DUNCAN test) for the average number of seed per pod character to some bean genotypes cultivated to Banu Maracine R.S. (average 2005-2008)

Clasification	Variant	Stem height (cm)	The difference towards the variant on the place:								
-	-	-	X	IX	VIII	VII	VI	V	IV	III	II
I	Ianca	5.11	2.47^{x} 0.66	1.46^{x} 0.66	1.36^{x} 0.65	1.09^{x} 0.64	1.03^{x} 0.63	0.98^{x} 0.62	0.97^{x} 0.61	0.48 0.59	0.04 0.56
II	Boureni	5.07	2.43^{x} 0.66	1.42^{x} 0.65	1.32^{x} 0.64	1.05^{x} 0.63	0.99^{x} 0.62	0.94^{x} 0.61	0.93^{x} 0.59	0.44 0.56	
III	Ostroveni	4.63	1.99^{x} 0.65	0.98^{x} 0.64	0.88^{x} 0.63	0.61 0.62	0.55 0.61	0.50 0.59	0.49 0.56		
IV	Targu Jiu	4.14	1.50^{x} 0.64	0.49 0.63	0.39 0.62	0.12 0.61	0.06 0.59	0.01 0.56			
V	Leu	4.13	1.49^{x} 0.63	0.48 0.62	0.38 0.61	0.11 0.59	0.05 0.56				
VI	Star	4.08	1.44^{x} 0.62	0.43 0.61	0.33 0.59	0.06 0.56					
VII	Osica	4.02	1.38^{x} 0.61	0.37 0.59	0.27 0.56						
VIII	Poiana-Mare	3.75	1.11^{x} 0.59	0.10 0.56							
IX	Bralostita	3.65	1.01^{x} 0.56								
X	Pielesti	2.64									

Relative to the average number of seed per plant, an important character for plant productivity (Table 4), it can appreciate that the analyzed genotypes presents higher differences between them, in 23 cases from the total of 45, the differences being significant.

It can be emphasized the genotypes of Targu Jiu and Star which register significant differences toward other cultivars, which indicates the intrinsically value of the populations as concerns this character.

Total number of seed/plant represents an important character polygenic determined, with a complex heredity (Saulescu, N.N., 1975).

In the experimented material, this character presented the highest variability, in the 38 cassis from the total of 45 cassis, the differences between genotypes were significant. It can emphasize as valuable forms for this character the genotypes of Star, Boureni, Ianca and Leu, which registered significant differences towards other populations.

The size of the seed comes out also from the one thousand seed mass, this character being variable depending on genotype. Among the elements which influence mostly the productivity of one genotype, the number and the weight of seed are the most important (Potlog, A.S., and co., 1989).

From table 6 it can notice that the variability of this character is much accentuated to the studied genotypes, identifying 28 significant differences on the basis of Duncan test, from the total of 45 cassis. Among the experimented genotypes it emphasizes with significant differences towards other genotypes - Bralostita and Poiana Mare populations.

Table 5

The analisys of multiple comparison (DUNCAN test) for the total number of seed/plant character to some bean genotypes cultivated to Banu Maracine R.S. (average 2005-2008)

Clasification	Variant	Total no. of seed	The difference towards the variant on the place:								
-	-	-	X	IX	VIII	VII	VI	V	IV	III	II
I	Ianca	120.1	58.04^{x} 11.32	41.36^{x} 11.25	40.04^{x} 11.12	33.54^{x} 11.01	29.15^{x} 10.84	24.93^{x} 10.67	20.84^{x} 10.43	19.6^{x} 10.09	14.1^{x} 9.58
II	Boureni	106.0	43.94^{x} 11.25	27.26^{x} 11.12	25.94^{x} 11.01	19.44^{x} 10.84	15.05^{x} 10.67	10.83^{x} 10.43	6.74^{x} 10.09	5.5 9.58	
III	Ostroveni	100.5	38.44^{x} 11.12	21.76^{x} 11.01	20.44^{x} 10.84	13.94^{x} 10.67	9.55^{x} 10.43	5.33^{x} 10.09	1.24 9.58		
IV	Targu Jiu	99.26	37.2^{x} 11.01	20.52^{x} 10.84	19.2^{x} 10.67	12.7^{x} 10.43	8.31^{x} 10.09	4.09 9.58			
V	Leu	95.17	33.11^{x} 10.84	16.43^{x} 10.67	15.11^{x} 10.43	8.61^{x} 10.09	4.22 9.58				
VI	Star	90.95	28.89^{x} 10.67	12.21^{x} 10.43	10.89 10.09	4.39 9.58					
VII	Osica	86.56	24.5^{x} 10.43	7.82^{x} 10.09	6.5 9.58						
VIII	Poiana-Mare	80.06	18.0^{x} 10.09	1.32^{x} 9.58							
IX	Bralostita	78.74	16.68^{x} 9.58								
X	Pielesti	62.06									

CONCLUSIONS

The obtained results after the statistically calculation of the data indicates the fact that the experimented genotypes represents a diverse biological material, with a high genetic variability, which allow to make some breeding works.

Average value of the studied characters was utilized for the comparison of the experimented variants with the help of Duncan test and it was establish the semnificance of the differences between them.

Table 6

The analisys of multiple comparison (DUNCAN test) for the one thousand seed mass character to some bean genotypes cultivated to Banu Maracine R.S. (average 2005-2008)

Clasification	Variant	Total no. of seed	The difference towards the variant on the place:								
-	-	-	X	IX	VIII	VII	VI	V	IV	III	II
I	Ianca	429.2	208.4^{x} 48.33	174.9^{x} 48.03	145.0^{x} 47.45	143.4^{x} 47.01	120.8^{x} 46.28	113.4^{x} 45.55	91.2^{x} 44.53	85.4 43.07	44.8 40.88
II	Boureni	384.6	163.6^{x} 48.03	130.1^{x} 47.45	100.2^{x} 47.01	98.6^{x} 46.28	76.0^{x} 45.55	68.6^{x} 44.53	46.4^{x} 43.07	40.6 40.88	
III	Ostroveni	344.0	123.0^{x} 47.45	89.50^{x} 47.01	59.6^{x} 46.28	58.0^{x} 45.55	35.4 44.53	28.0 43.07	5.8 40.88		
IV	Targu Jiu	338.2	117.2^{x} 47.01	83.7^{x} 46.28	53.8^{x} 45.55	52.2^{x} 44.53	29.6 43.07	22.2 40.88			
V	Leu	316.0	95.0^{x} 46.28	61.5^{x} 45.55	31.6 44.53	30.3 43.07	7.4 40.88				
VI	Star	308.6	87.6^{x} 45.55	54.1^{x} 44.53	24.2 43.07	22.6 40.88					
VII	Osica	286.0	65.0^{x} 44.53	31.5 43.07	1.60 40.88						
VIII	Poiana-Mare	284.4	63.4^{x} 43.07	29.9 40.88							
IX	Bralostita	254.5	33.5 40.88								
X	Pielesti	221.0									

On the basis of the obtained differences it were emphasize some genotypes with high variability as concerns some important characters for bean breeding which can be utilized as gene sources in the breeding process of this specie.

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